

NIR color vs Launch Date: A 20-year analysis of space weathering effects on the Boeing 376 spacecraft

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ABSTRACT

The Boeing HS-376 spin stabilized spacecraft was a popular design that was launched continuously into geosynchronous orbit starting in 1980 with the last launch occurring in 2002. Over 50 of the HS-376 buses were produced to fulfill a variety of different communication missions for countries all over the world. The design of the bus is easily approximated as a telescoping cylinder that is covered with solar cells and an Earth facing antenna that is despun at the top of the cylinder.

The similarity in design and the number of spacecraft launched over a long period of time make the HS-376 a prime target for studying the effects of solar weathering on solar panels as a function of time.

A selection of primarily non-operational HS-376 spacecraft launched over a 20 year time period were observed using the United Kingdom Infrared Telescope on Mauna Kea and multi-band near-infrared photometry produced. Each spacecraft was observed for an entire night cycling through ZYJHK filters and time-varying colors produced to compare near-infrared color as a function of launch date. The resulting analysis shown here may help in the future to set launch date constraints on the parent object of unidentified debris objects or other unknown spacecraft.